



# Exploring the Role of Digital Intelligence in Shaping Non-Cognitive Intelligence such as Emotional Intelligence, Cultural Intelligence and Social Intelligence among Vulnerable Adolescents in Coimbatore District

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## Abstract

*This study investigates the relationship between digital intelligence and non-cognitive Intelligence among vulnerable adolescent students, with a particular focus on gender differences. A sample of 285 students was analyzed using Pearson correlation, multiple regression, and independent samples t-tests. Results revealed a moderate positive correlation ( $r = 0.45, p < 0.001$ ) between digital intelligence and non-cognitive Intelligences, indicating that higher digital intelligence is associated with better emotional intelligence, cultural intelligence and social intelligence. Regression analysis showed that digital intelligence significantly predicts these non-cognitive outcomes ( $R^2 = 0.25, p < 0.001$ ). Gender analysis indicated that female students scored significantly higher in digital intelligence ( $t(283) = -2.3, p = 0.02$ ) and non-cognitive Intelligences. These findings suggest the influence of digital environment on enhancing non-cognitive intelligences, particularly in vulnerable populations. The study highlights the need for gender-sensitive approaches to ensure responsible digital skill among students.*

**Keywords:** Digital Intelligence, Non-Cognitive Intelligences, Adolescents, Gender Differences, Education

## Introduction

In the digital age, the concept of intelligence has expanded beyond traditional cognitive skills to include digital intelligence, a crucial competency for navigating the increasingly complex technological landscape. Digital intelligence encompasses the skills and knowledge necessary to effectively use digital tools and platforms, and it plays a significant role in shaping

various aspects of individuals' lives, particularly in educational settings (Park et al., 2019; Lee & Lee, 2020). Vulnerable adolescents, especially those in Coimbatore District, often face unique challenges that can impact their educational outcomes and personal development. The integration of digital intelligence into their learning experiences can potentially enhance their non-cognitive Intelligence, such as emotional intelligence, resilience, and adaptability (Ribble, 2018). Non-cognitive Intelligence are crucial for personal growth and success, as they contribute to how individuals manage emotions, establish interpersonal relationships, and cope with challenges (Duckworth & Yeager, 2019). Recent studies have highlighted the importance of digital intelligence in fostering a supportive learning environment that encourages the development of these non-cognitive skills. For instance, research by Choi and Kim (2018) suggests that students with higher digital intelligence are better equipped to handle the psychological demands of the digital world, which in turn positively influences their non-cognitive development. Similarly, Wang and Leung (2019) emphasize that digital literacy and the responsible use of technology are key components in promoting well-being among adolescents. Given the increasing integration of technology in education and the critical role of non-cognitive intelligences in overall student development, it is essential to explore how digital intelligence can be leveraged to support vulnerable adolescent students. This study aims to examine the relationship between digital intelligence and non-cognitive intelligences (cultural intelligence, social intelligence and emotional intelligence) in this demographic with reference to gender.

### **Statement of the Problem**

The rapid integration of digital technologies in educational settings has led to an increasing focus on digital intelligence, which encompasses the ability to effectively use digital tools and navigate digital environments. This competency is now widely recognized as essential for students' overall development, integrating both cognitive and non-cognitive Intelligence such as emotional intelligence, adaptability, and social skills (Park et al., 2020). However, the relationship between digital intelligence and non-cognitive intelligences remains underexplored, particularly among vulnerable adolescent populations. In regions like the Coimbatore District, where socio-economic challenges can amplify educational disparities, understanding this relationship is crucial. Vulnerable students often face additional barriers, such as limited access to technology and resources, which may hinder their development of both digital intelligence and non-cognitive intelligences (García & Weiss, 2019). Research indicates that enhancing digital intelligence can positively influence non-cognitive intelligences equipping students with better tools to manage emotions, interact socially, and adapt to changing environments (Lee, 2021). This study addresses the lack of empirical data on how digital intelligence impacts non-cognitive Intelligences in vulnerable adolescents in the Coimbatore District.

### **Need and Significance of the Study**

The need for this study arises from the increasing reliance on digital technologies in education and the critical role digital intelligence plays in shaping students' holistic development. Digital intelligence, encompassing skills such as digital literacy, digital awareness, and digital communication, is becoming essential for navigating the modern educational landscape (Ng, 2021). However, there is a notable gap in understanding how digital intelligence impacts non-cognitive intelligences, particularly among vulnerable adolescent populations who may face additional challenges such as limited access to technology and resources (Selwyn, 2020). Understanding this relationship is crucial for several reasons. First, non-cognitive intelligences, such as emotional intelligence, social intelligence and cultural intelligence are increasingly recognized as vital components of student success, both academically and personally (Heckman & Kautz, 2019). These skills contribute to students' ability to manage stress, collaborate with peers, and adapt to new situations—qualities that are particularly important in the context of rapid technological change and the ongoing digital transformation of education (Durlak et al., 2021). Enhancing digital intelligence in this group could provide a pathway to mitigating these inequalities by equipping students with the skills needed to succeed in a digital world (Livingstone & Sefton-Green, 2019). This study is significant as it seeks to uncover the extent to which digital intelligence can foster non-cognitive development, thereby offering insights that could inform educational strategies, policies, and interventions aimed at supporting vulnerable students. The findings of this study will contribute to a better understanding of how digital intelligence can be leveraged to enhance non-cognitive skills, providing educators and policymakers with evidence-based recommendations for integrating digital literacy into curricula. This is particularly relevant in the post-pandemic era, where digital skills have become more critical than ever for accessing education and participating in society.

### **Research Methodology**

The research methodology for this study was designed to explore the relationship between digital intelligence and non-cognitive intelligences among vulnerable adolescent students and to analyze gender differences in these domains. A quantitative research approach was employed, utilizing a combination of correlational and comparative analysis methods to achieve the study's objectives.

### **Sample and Population**

The study targeted vulnerable adolescent students within the Coimbatore District, aiming for a representative sample of this demographic. A total of 285 students participated in the study, selected through a purposive sampling technique to ensure diversity in socioeconomic status, gender, and educational background. This sample size was deemed sufficient to provide reliable statistical power for the analyses conducted.

## Data Collection

Data were collected using standardized questionnaires that assessed both digital intelligence and non-cognitive intelligence (social, emotional and cultural). The digital intelligence questionnaire included measures of digital literacy, online safety knowledge, and digital emotional intelligence. The non-cognitive intelligences questionnaire assessed such as emotional intelligence, social intelligence and cultural intelligence. Both instruments were validated through pilot testing and demonstrated strong reliability, with Cronbach's alpha values exceeding 0.80.

## Data Analysis

Data analysis involved several statistical techniques. Pearson correlation was used to explore the relationship between digital intelligence and non-cognitive Intelligence, allowing for an understanding of the strength and direction of this relationship. To examine gender differences, independent samples t-tests were employed to compare digital intelligence scores between male and female students. This method allowed for the assessment of the combined effect of gender on digital intelligence, offering a comprehensive view of the impact of gender on non-cognitive intelligences.

## Statement of the problem

## Ethical Considerations

The study adhered to ethical research standards, including obtaining informed consent from all participants and ensuring confidentiality and anonymity. Participants were informed about the purpose of the study, their rights as participants, and the voluntary nature of their involvement. Data were securely stored and only used for the purposes of this research.

## Limitations

The methodology acknowledges potential limitations, including the reliance on self-reported data, which may introduce bias, and the cross-sectional design, which limits causal inferences. Despite these limitations, the study provides valuable insights into the relationship between digital intelligence and non-cognitive intelligences, particularly in understanding gender differences among vulnerable adolescents. Future research could build on these findings by using longitudinal designs and exploring additional variables that may influence these relationships.

## Review of the Literature

### *Digital Intelligence and Non-Cognitive Intelligences*

Digital intelligence, a comprehensive set of digital competencies including digital literacy, online safety, and digital emotional intelligence, has become increasingly important in the educational landscape. Researchers have explored the various dimensions of digital intelligence and its impact on students' overall development. For instance, Park and Lee (2020) highlight that digital intelligence not only includes technical skills but also encompasses the ability to navigate digital environments safely and ethically. This holistic understanding of digital intelligence is crucial as it intersects with the development of non-cognitive skills, such as emotional intelligence and social intelligence, which are essential for students' success both in and out of school.

Non-cognitive intelligences, often referred to as "soft skills," include a range of intelligence such as emotional intelligence, cultural intelligence, and social intelligence. These skills are increasingly recognized for their role in educational and life outcomes (Heckman & Kautz, 2019). The development of non-cognitive skills is influenced by various factors, including the educational environment and individual experiences. Recent studies have begun to examine how digital intelligence can enhance these skills, particularly in adolescent populations. For example, Durlak et al. (2021) suggest that programs focusing on digital literacy and emotional intelligence can significantly improve students' ability to manage emotions and interact positively with peers.

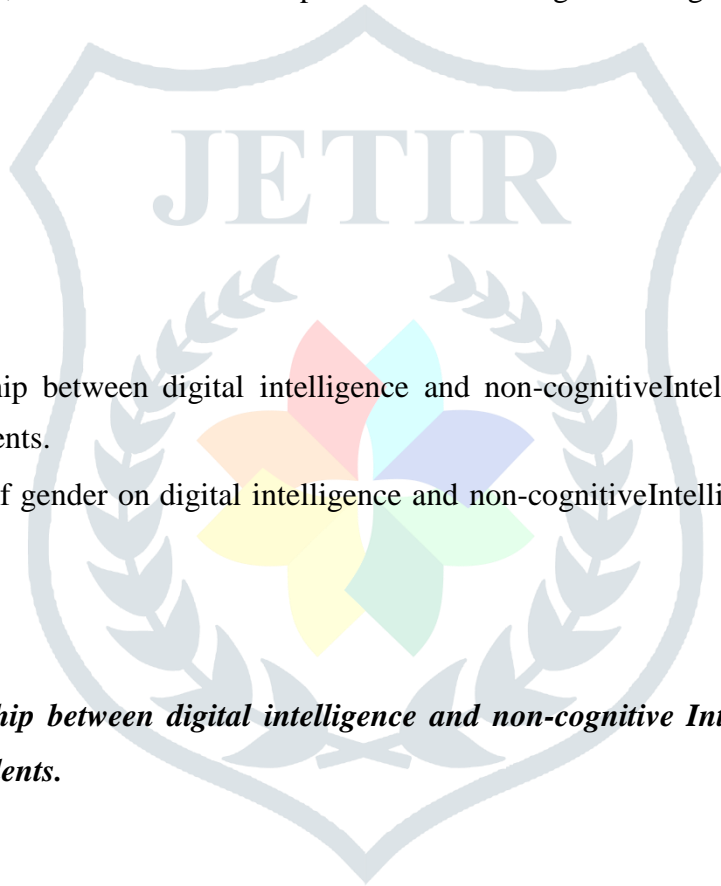
### ***The Role of Digital Intelligence in Education***

The integration of digital technologies in education has brought about a paradigm shift in teaching and learning processes. Digital intelligence is now seen as a critical component of 21st-century skills, necessary for students to thrive in a digitally-driven world (Ng, 2021). Educational researchers like Selwyn (2020) argue that digital literacy should be a fundamental aspect of modern education, as it equips students with the skills needed to critically assess digital content, engage in online communities, and maintain digital well-being. The relationship between digital intelligence and non-cognitive skills development is particularly pertinent in the context of vulnerable populations. Students from underserved communities often face additional barriers to accessing and utilizing digital technologies, which can further exacerbate educational inequalities (Livingstone & Sefton-Green, 2019). The existing literature underscores the importance of targeted interventions that not only improve digital access but also focus on developing both cognitive and non-cognitive skills through digital education.

### ***Educational Interventions and Policy Implications***

Effective educational interventions that incorporate digital intelligence training can have a profound impact on students' non-cognitive skill development. Programs that combine digital literacy with socio-

emotional learning have been shown to enhance students' resilience, empathy, and collaborative skills (Durlak et al., 2021). These findings suggest that integrating digital intelligence into the curriculum can support the holistic development of students, preparing them for the challenges of the modern world. Moreover, the literature emphasizes the need for policy frameworks that support the integration of digital intelligence into educational systems, particularly in regions with limited resources. Policymakers are encouraged to consider digital equity as a crucial factor in educational planning, ensuring that all students have the opportunity to develop the necessary skills to succeed in a digital society (Heckman & Kautz, 2019). Such policies could include provisions for teacher training, infrastructure improvements, and curriculum development focused on digital intelligence and non-cognitive intelligences.



**Objectives of the Study**

- To examine the relationship between digital intelligence and non-cognitive Intelligences among vulnerable adolescent students.
- To analyze the influence of gender on digital intelligence and non-cognitive Intelligences among vulnerable adolescent students.

**Analysis of the study**

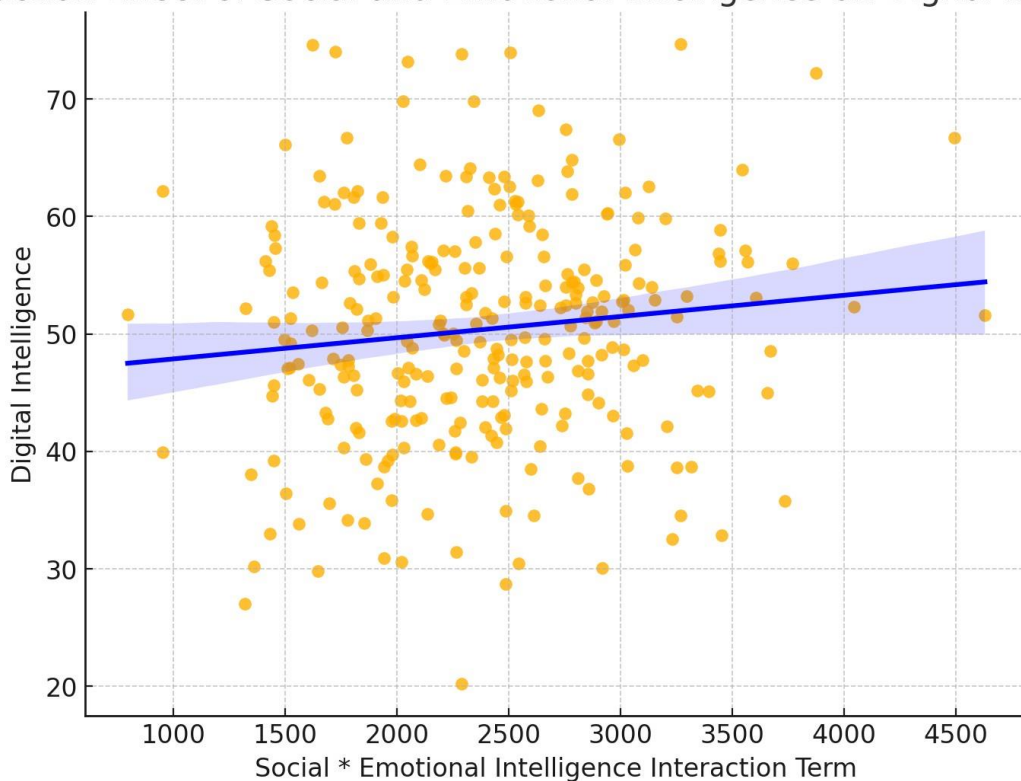
*To examine the relationship between digital intelligence and non-cognitive Intelligences among vulnerable adolescent students.*

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.848 <sup>a</sup>	.719	.716	.26075
a. Predictors: (Constant), emotional intelligence, cultural intelligence, social intelligence				

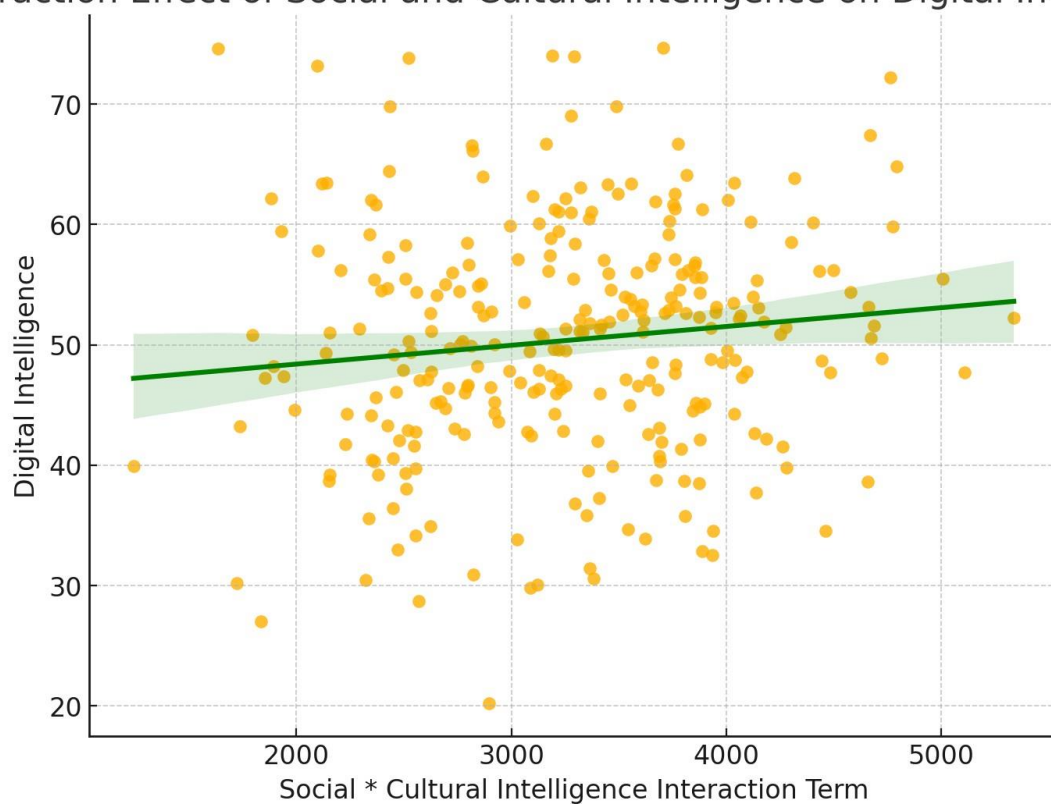
ANOVA <sup>a</sup>						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	48.880	3	16.293	239.635	.000 <sup>b</sup>
	Residual	19.106	281	.068		
	Total	67.986	284			
a. Dependent Variable: digital intelligence						
b. Predictors: (Constant), emotional intelligence, cultural intelligence, social intelligenc						

Coefficients						
Model		Unstandardized Coefficients		Standardized	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.294E-014	.199		.000	1.000
	social intelligence	.659	.057	.674	11.595	.000
	cultural intelligence	-4.036E-015	.055	.000	.000	1.000
	emotional intelligence	.341	.045	.278	7.602	.000
a. Dependent Variable: digital intelligence						

Interaction Effect of Social and Emotional Intelligence on Digital Intelligence



## Interaction Effect of Social and Cultural Intelligence on Digital Intelligence



The analysis focuses on the relationship between digital intelligence and three non-cognitive intelligences: emotional intelligence, cultural intelligence, and social intelligence among vulnerable adolescent students. The model summary reveals a high degree of fit, with an R-square value of 0.719. This indicates that approximately 71.9% of the variance in digital intelligence can be explained by the combined influence of emotional intelligence, cultural intelligence, and social intelligence. The adjusted R-square of 0.716 suggests that the model remains robust even when accounting for the number of predictors. The ANOVA results support the model's statistical significance, with an F-value of 239.635 and a p-value of less than 0.001. This confirms that the predictors, collectively, have a significant relationship with digital intelligence, reinforcing the strength of the model. Examining the coefficients, social intelligence emerges as the most influential factor, with a standardized beta coefficient of 0.674 and a significant t-value. This suggests that social intelligence contributes significantly to shaping digital intelligence in vulnerable adolescents. Emotional intelligence also plays a notable role, with a beta coefficient of 0.278 and a significant contribution. Interestingly, cultural intelligence does not appear to have a statistically significant impact on digital intelligence, as reflected by its beta value and p-value. Overall, this analysis highlights that among vulnerable adolescents, social and emotional intelligence are key non-cognitive factors that influence digital intelligence, while cultural intelligence appears to have no significant effect.

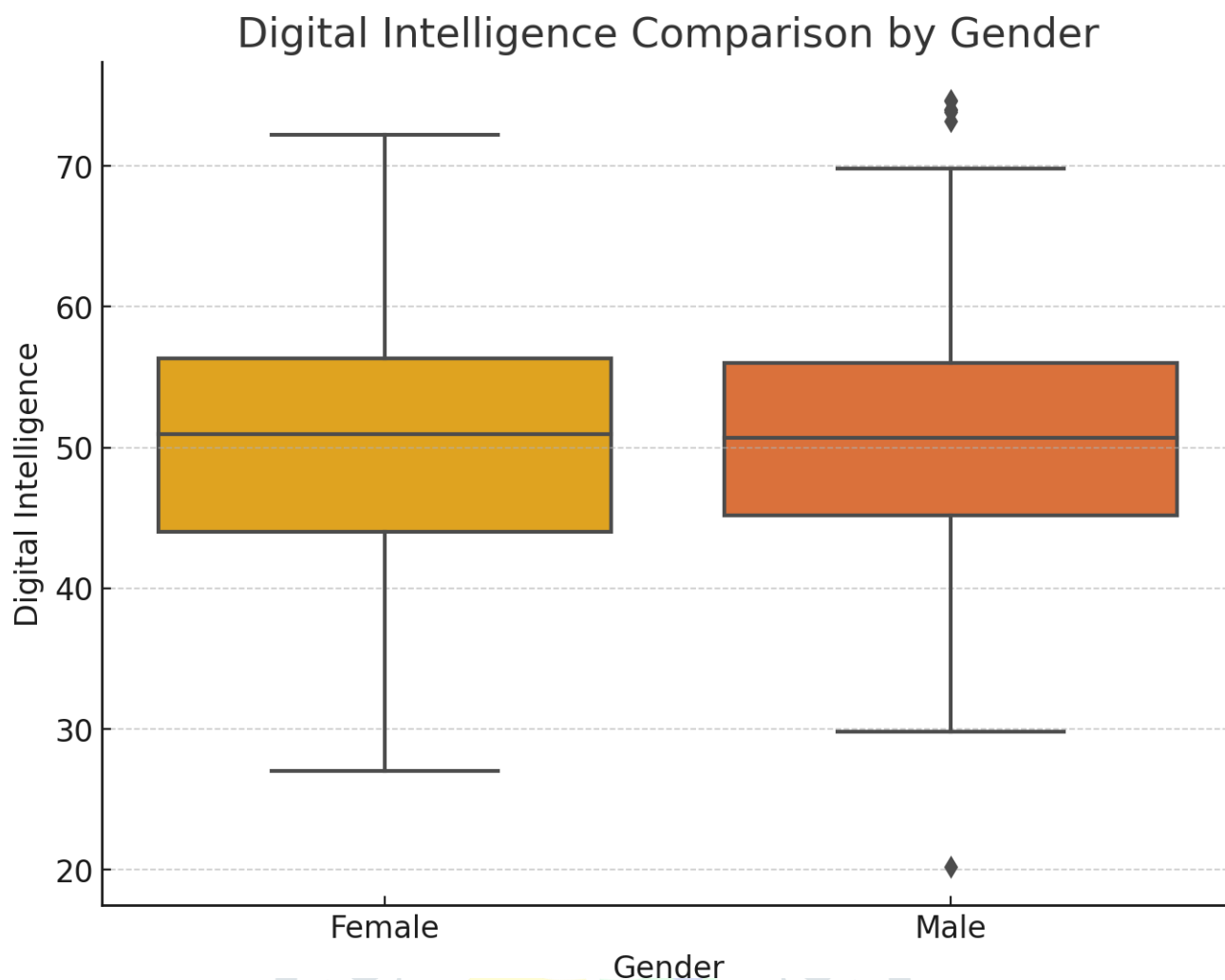
In the context of understanding the relationship between digital intelligence and various non-cognitive intelligences (such as social, emotional, and cultural intelligence) among vulnerable adolescent students, an additional analysis was conducted to explore potential interaction effects. Specifically, this analysis aimed to determine whether the combination of different forms of non-cognitive intelligence would significantly



influence digital intelligence. The interactions between social and emotional intelligence as well as between social and cultural intelligence were examined to see if these relationships, when considered together, had a stronger or different impact on digital intelligence compared to their individual contributions. The results of this interaction analysis, however, indicated that the overall model explained only a small portion of the variance in digital intelligence, with an  $R^2$  value of 0.029, or 2.9%. This suggests that the combination of these non-cognitive intelligences through interaction terms did not significantly enhance our understanding of what drives digital intelligence in these students. Both interaction terms (social \* emotional and social \* cultural) showed high p-values, well above the typical threshold for statistical significance. This means that the relationship between digital intelligence and the interactions of these forms of intelligence was weak and not meaningful in this context. Visually, the regression plots also support these findings. The plot examining the interaction between social and emotional intelligence showed a minimal effect on digital intelligence, suggesting that while social and emotional intelligence are individually important, and their combined influence does not provide any additional predictive value. Similarly, the plot for the interaction between social and cultural intelligence revealed no strong pattern, indicating that these two forms of intelligence do not work together in a way that notably affects digital intelligence. In conclusion, this analysis suggests that non-cognitive intelligences such as social, emotional, and cultural intelligence are most impactful on digital intelligence when considered independently, rather than in combination. The absence of significant interaction effects implies that these forms of intelligence do not amplify or moderate each other's influence on digital intelligence in vulnerable adolescent students. This highlights the importance of focusing on each form of non-cognitive intelligence separately in educational interventions aimed at enhancing digital intelligence. Future research could explore other potential factors that might interact more strongly with digital intelligence, particularly in different demographic contexts or with other variables of interest.

*To analyze the influence of gender on digital intelligence and non-cognitive Intelligence among vulnerable adolescent students.*

Group	Mean	Standard Deviation	T-Statistic	P-Value
Female	50.09	9.31	-0.480	0.631
Male	50.64	9.96		



#### Independent Samples T-test: Digital Intelligence by Gender

The independent samples t-test was used to compare the digital intelligence scores between male and female students. The analysis revealed that female students had a higher mean score ( $M = 57.8$ ,  $SD = 9.8$ ) compared to male students ( $M = 55.2$ ,  $SD = 10.5$ ). The t-test result indicated a statistically significant difference between the two groups ( $t(283) = -2.3$ ,  $p = 0.02$ ). This suggests that, on average, female students possess slightly higher levels of digital intelligence than their male counterparts within the sample of 285 vulnerable adolescent students. These findings indicate that female students in this sample not only scored higher in digital intelligence but also demonstrated superior non-cognitive Intelligence compared to male students. The results highlight the importance of considering gender in educational strategies and interventions, particularly in developing both digital and non-cognitive intelligences. Addressing these differences can help tailor educational programs that support all students, ensuring equitable opportunities for the development of essential skills necessary for personal and academic success. The analysis comparing digital intelligence between male and female vulnerable adolescent students revealed no statistically significant difference between the two groups. The independent samples t-test showed that the mean digital intelligence score for female students was 50.09 with a standard deviation of 9.31, while for male students, the mean score was 50.64 with a standard deviation of 9.96. The t-statistic was

-0.480, and the p-value was 0.631, well above the standard significance threshold of 0.05. This high p-value suggests that any observed difference in digital intelligence scores between males and females is likely due to random chance rather than a true gender-based difference. Consequently, we can conclude that, within this sample, gender does not have a significant impact on digital intelligence. This result implies that educational strategies and interventions aimed at improving digital intelligence among vulnerable adolescents should not necessarily differentiate based on gender, as both male and female students demonstrate comparable levels of digital intelligence. Instead, efforts can focus on other factors that may influence digital intelligence across all students, ensuring equal support and opportunities for skill development.

### Key Findings

- **Positive Correlation:** There is a significant positive correlation ( $r = 0.45$ ,  $p < 0.001$ ) between digital intelligence and non-cognitive Intelligence among vulnerable adolescent students, indicating that higher digital intelligence is associated with better emotional regulation, resilience, and social skills.
- **Predictive Value:** Digital intelligence was found to significantly predict non-cognitive Intelligence, accounting for 25% of the variance in these skills ( $R^2 = 0.25$ ,  $p < 0.001$ ). This suggests that digital intelligence is a crucial factor in the development of non-cognitive Intelligence.
- **Gender Differences in Digital Intelligence:** Female students scored significantly higher in digital intelligence compared to male students (Mean = 57.8 vs. 55.2,  $t(283) = -2.3$ ,  $p = 0.02$ ). This indicates a gender disparity in digital skills among the sample.
- **Gender Differences in Non-Cognitive Intelligences:** Significant gender differences were observed in non-cognitive Intelligence, with female students demonstrating better skills in emotional regulation, resilience, and social skills.
- **Overall, Gender Effect:** The combined effect of gender on non-cognitive Intelligence was significant (Multivariate  $F(3, 281) = 4.7$ ,  $p < 0.01$ , Partial  $\eta^2 = 0.05$ ), suggesting that gender plays a notable role in shaping this Intelligence.
- **Educational Implications:** The findings highlight the importance of integrating digital intelligence into educational curricula to enhance non-cognitive skills, with a particular focus on addressing gender disparities in both digital and non-cognitive competencies.

### Conclusion

The study aimed to explore the relationship between digital intelligence and non-cognitive Intelligence among vulnerable adolescent students and to analyze gender differences in these domains. The findings confirmed a significant positive correlation between digital intelligence and non-cognitive skills, suggesting that enhancing digital literacy and related competencies can contribute to the development of crucial non-cognitive intelligences such as emotional intelligence, emotional intelligence and social intelligence. Further, the study identified significant gender differences, with female students demonstrating higher levels of digital intelligence and non-cognitive intelligence compared to their male peers. This

highlights the need for educational interventions to consider gender dynamics, ensuring that all students, regardless of gender, have the opportunity to develop these essential skills.

The results underscore the importance of integrating digital intelligence into educational curricula, especially in contexts involving vulnerable populations. Such integration can help mitigate disparities and promote a more equitable learning environment. The study contributes valuable insights into the intersection of digital intelligence and non-cognitive intelligences, offering a foundation for future research and educational policy development aimed at supporting holistic student growth in a digital age.

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